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Stabilizing augmented reality reticles

Xavier Benavides Palos

Bryan Woods

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ABSTRACT

Augmented reality applications place virtual objects in a user's real, three-dimensional space. To do so, such applications use reticles, e.g., crosshairs within the screen of the mobile device, to enable the user to select a placement point in real space. The reticles are placed in the image of the real space by ray-casting from the center of the screen to planes detected in the real space. Due to a constant, low-amplitude, involuntary, noise-like movement of the user's hand, the placement of the virtual object is often imprecise and difficult to localize. This disclosure describes techniques that enable a user to precisely place a virtual object by subjecting reticular readings to a low-pass filter that removes the small, noise-like movements of the phone by averaging.

KEYWORDS

- Augmented reality
- Reticle
- Virtual object
- Object placement
- Reticle stabilization

BACKGROUND

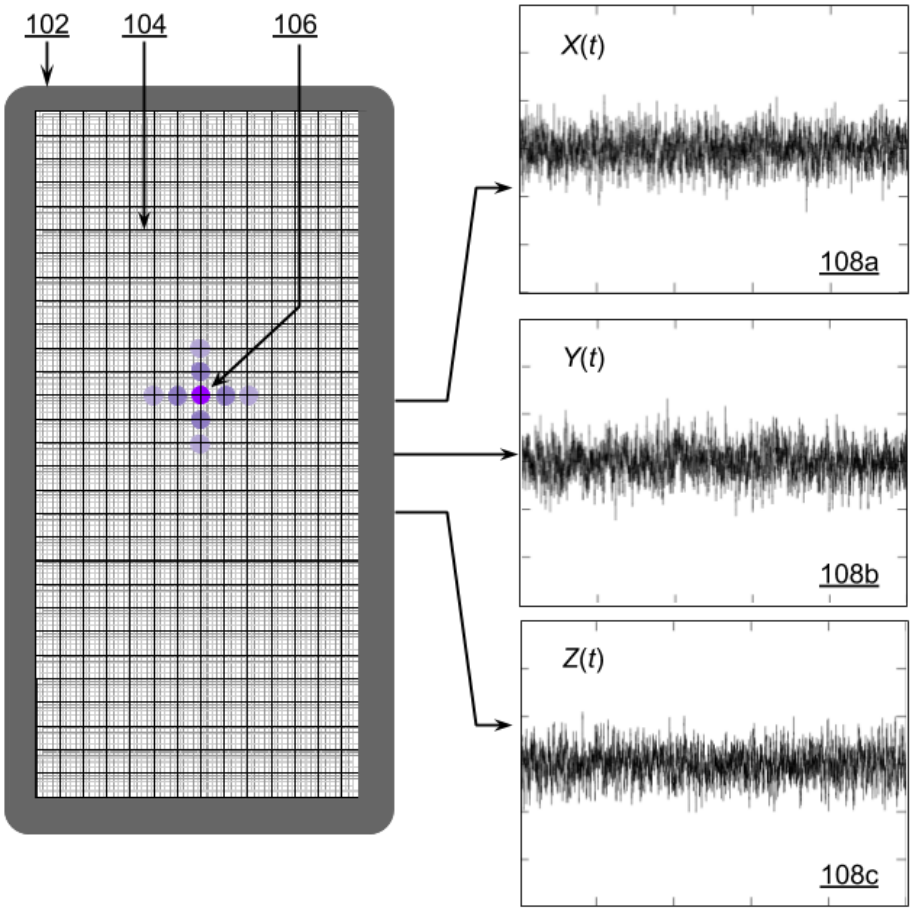

Fig. 1: Noisy reticular signals

Augmented reality applications place virtual objects in a user's real, three-dimensional space. As illustrated in Fig. 1, reticles (104), e.g., crosshairs within the screen of a mobile device (102), enable the user to select the point of placement (106) of the virtual object in real space. The reticles are placed in the image of the real space by ray-casting from the center of the screen to planes present in the real space. Due to an involuntary, low-amplitude, noise-like movement of the user's hand, the reticles constantly vibrate with reference to the background image. The point of placement of the virtual object thereby constantly moves and is imprecise and difficult to localize. The vibratory movement of the placement point is manifested as noise in the (*X*, *Y*, *Z*) waveforms (108a-c) of the placement point.

DESCRIPTION

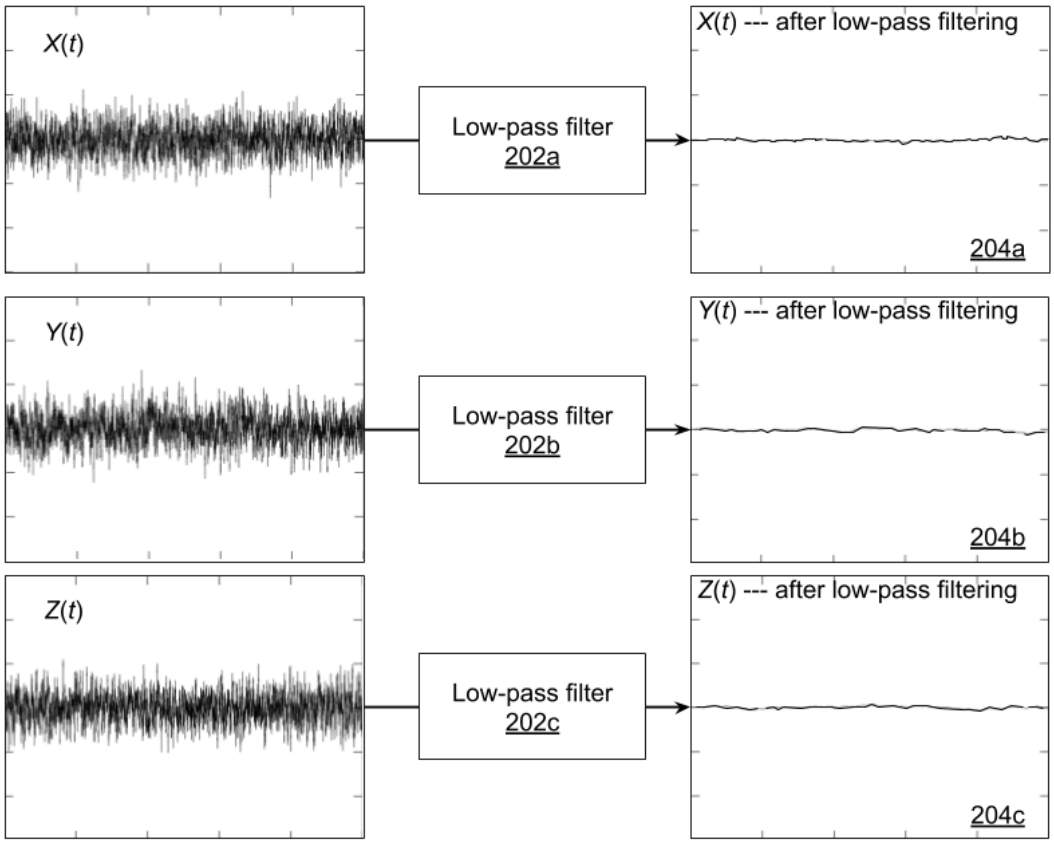

Fig. 2: Low-pass filtering to stabilize AR reticles

Per the techniques of this disclosure, illustrated in Fig. 2, the (*X*, *Y*, *Z*) waveforms of the placement point of the virtual object are processed by low-pass filters (202a-c) to produce a smooth, relatively noise-free (*X*, *Y*, *Z*) placement (204a-c) for the virtual object. Effectively, the reticle is not placed directly in the ray-cast from the center of the screen to the real-space; rather, a low-pass filtered and stabilized reticle removes the noisy vibratory motions of the phone.

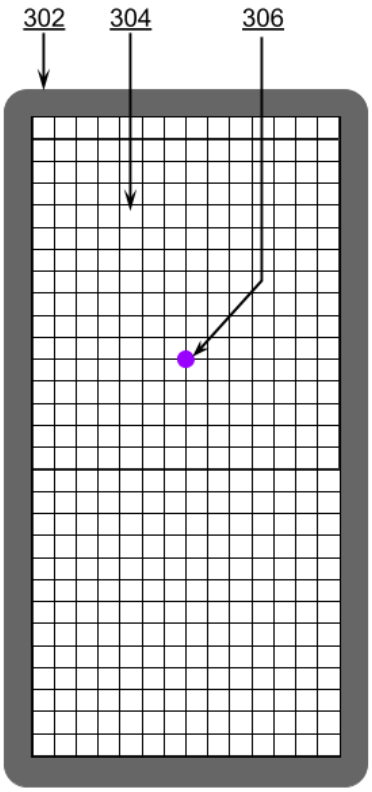

Fig. 3: A stabilized reticle

Fig. 3 illustrates a reticle (304) and the placement point (306) of a virtual object after stabilization per techniques of this disclosure. As seen by the user, the stabilized placement point exhibits very little noise-like motion despite the ongoing vibratory motion of the mobile device (302).

CONCLUSION

This disclosure describes techniques that enable a user to precisely place a virtual object in real, three-dimensional space by subjecting reticular readings to a low-pass filter that removes the small, noise-like movements of the mobile device.